

THREE NEW TAXA OF DIATOMS FROM WESTERN AUSTRALIA

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SUMMARY. — *Synedra acus* Kütz var. *varipunctata*, *Navicula stigmatisfera*, and *Navicula gracilis* Ehr. var. *mandurahensis* are described as new taxa of Diatoms from Western Australia. Their systematic status and ecology are discussed.

RÉSUMÉ — *Synedra acus* Kütz var. *varipunctata*, *Navicula stigmatisfera* et *Navicula gracilis* Ehr var. *mandurahensi* sont décrits comme nouveaux taxons de diatomées de l'Australie occidentale. Leur taxonomie et leur écologie sont examinées.

INTRODUCTION

The taxonomy of diatoms in Western Australia has received very little attention. The only published work on diatoms of Western Australia was by CROSBY and WOOD (1959) in which some diatoms from the Swan River, Perth were listed. The present author has been studying diatoms from the various aquatic habitat of Western Australia for the past five years. The present paper describes three new taxa of diatoms. The systematic study of these diatoms was completed at the Diatom Herbarium, Limnology Department, Academy of Natural Sciences, Philadelphia, U.S.A., using its vast collection of type slides, and specialized literature.

METHODS

Diatom samples were collected from the various waterbodies and cleaned by boiling in concentrated Nitric acid and Hydrochloric acid. The cleaned diatoms were dried on cover slips and mounted in Hyrax (PATRICK and REI-

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MER, 1966). The slides were examined under 1000 x oil immersion and photomicrographs taken using a Zeiss photomicrograph camera. A portion of the cleaned diatoms was dried on cover glass, mounted on aluminium stub, gold coated in vacuum for observations in SEM. Scanning Electron Micrographs were taken in a JEOL JSM 35C operated by an accelerating voltage of 25 kv.

TAXONOMIC DESCRIPTION AND DISCUSSION

SYNEDRA ACUS KUTZ VAR. *VARIPUNCTATA* VAR. NOV.

(Plate I, fig. 1, 2, 3; Plate II, fig. 4, 5, 6).

Valva angusta lineari-lanceolata, apicibus rotundis usque ad capitatis vel subcapitatis, pseudoraphe lanceolata ad apices versus angusta, ad centrum versus latiore, striis punctatis ad apices versus densis, ad centrum versus laxioris brevibus irregularibus, striis ad apices valvarum praesens; Longitudo 70-160µm, latitudo 3.5µm (ad centrum), 1.5-3µm (ad apices), striae 18-22 in 10µm.

Valve narrow linear lanceolate with rounded subcapitate to capitate ends. Pseudoraphe narrow at the ends becoming broader toward the centre. Striae distinctly punctate, closely arranged at the ends, short, somewhat loose and irregular toward the centre; striae present even at the apices. Length 70-160µm, breadth 3.5µm at the centre and 1.5-3µm at the ends, striae 18-22 in 10µm.

Holotype. — A-G.C. No 40092. A-G.C. = Academy of Natural Sciences, Philadelphia, General Collection. (Deposited at the diatom herbarium, Acad. Nat. Sci., Phil., U.S.A.).

Type locality. — Martin Tank, Yalgorup National Park, 25-35 km South of Mandurah, Western Australia.

Distribution. — Lakes Clifton, Preston, Salt Lake and a string of minor lakes in Yalgorup National Park, Western Australia.

Discussion

This variety shows remarkable variation in size, shape and nature of the striae. Some valves are smoothly tapering to the rounded ends. In some, apices are somewhat attenuated, but most have capitate or subcapitate or subrostrate ends. Some are apically and transversely slightly asymmetrical. All are broad at the middle and narrow toward the ends. The striae and the punctae are both closely arranged toward the ends and irregularly placed toward the middle. The axial area becomes broad and ill defined towards the middle (Fig. 2 and 5). While the narrow axial area towards the apices is clear in some, it tends to be almost obliterated in some others. SEM shows the punctae as round and poroid (Fig. 4 and 6). The valves have discoid chromatophores and have a tendency to form loosely arranged clusters of stellate colonies occurring in periphytic form. Individual valves also occur in planktonic form. ROUND, F.E. (1979) analysed the status of the genus *Synedra*, using SEM observations. Structures such as apical pore field, helictoglossa and well defined sternum and ribs charac-

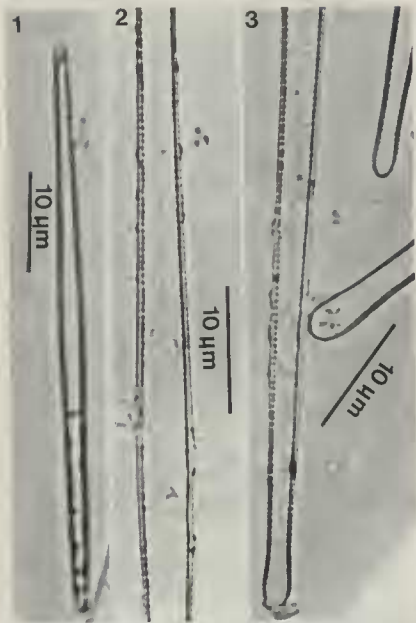


Plate 1. — *Synedra acus* Kütr var. *varispunctata* var. nov. (L.M.). 1: general view of the valve; 2: middle part of the valve showing the large axial area and irregular punctae; 3: apices of the valve showing variation in shape.

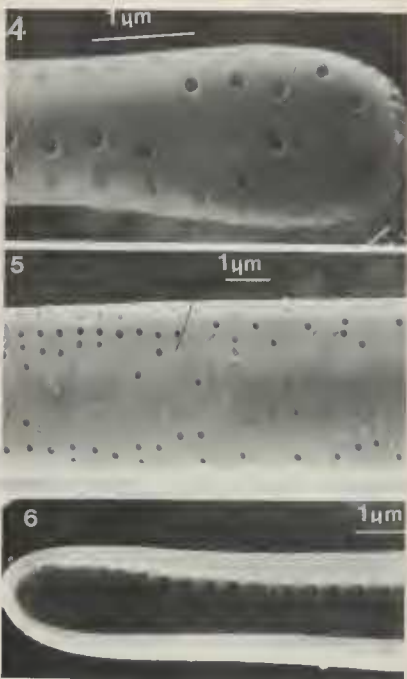


Plate II. — *Synedra acus* Kutz. var. *varispunctata* var. nov. (S.E.M.). 4: apices of the valve with poroid punctae; 5: middle of the valve; 6: interior surface of the valve.

teristic of some members of the subgenus *Eusynedra* were not found in this taxon.

This diatom was collected in winter, 1976, 1977 and summer, 1980, and occurred in large numbers in all the samples. The salt lakes of Yalgorup National Park, Western Australia, where this variety occurred, are hypersaline lakes with salinity ranging from 50‰ to 130‰. The chemical analysis of water samples showed high content of Ca, Mg, and Na in these lakes, i. e., 1.4 times the content of sea water. This is one of the few species of Diatoms found growing in the above lakes.

This variety can be distinguished from other varieties of *S. acus* Kütz by its denser striae, irregularly arranged punctae and the lack of well defined central area. Its ecology seems to be very different from other varieties, being well adapted to hypersalinity.

NAVICULA STIGMATIFERA SP. NOV.

(Plate III, fig. 7 & 8).

Valva valde convexa, lanceolata usque ad rhombico-lanceolatam, apicibus curvatis et protractis, area axiali angusta, area centrali elliptico lanceolata, stigmatibus serialibus necnon areis, rectangularibus hyalina utrinque ejusdem, striis punctatis, lineatis et radiatis ad centrum dissitis, raphe recta. Longitudo 62-80µm, latitudo 9-13µm, striae 10 to 11 in 10µm (versus).

Valve lanceolate to rhombic-lanceolate with slightly curved apices. Valve highly convex. Axial area narrow. Central area elliptic-lanceolate. Striae lineate, radiate throughout. Central striae more widely spaced than those toward the apices. Raphe straight. On either side of the central area there is a distinct row of stigmata and a rectangular hyaline area. Length 62-80µm, breadth 9-13µm, striae 10-11 in 10µm at the centre, and 12-13 in 10µm toward the apices.

Holotype. — A.G.C. No 40073. (Deposited at the Diatom Herbarium, Academy of Natural Sciences, Philadelphia, U.S.A.).

Type locality. — Canning River of the Swan River estuary system, Perth, Western Australia.

Distribution. — Swan River, Perth, Western Australia.

Discussion

This species occurred in small numbers, mostly in benthic and occasionally in planktonic samples collected in 1977 from the Canning-Swan River estuary system. The salinity of the estuary ranges from 2‰ to 34‰, depending upon seasonal changes of water flow. The sea water flows into the river during summer and fresh water flows into the sea downstream during winter rains.

This species resembles *Navicula cruciculoides* Brockmann (1950) in general shape and the nature of the apices and striae, but differs from it in the number

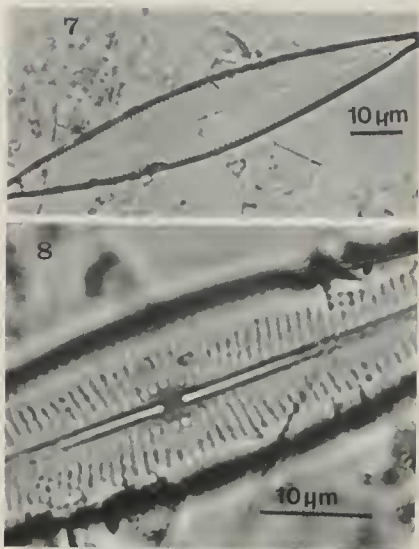


Plate III. — *Navicula stigmatifera* sp. nov. (L.M.). 7: valve view; 8: middle part of the valve showing the stigmata and the rectangular hyaline area.

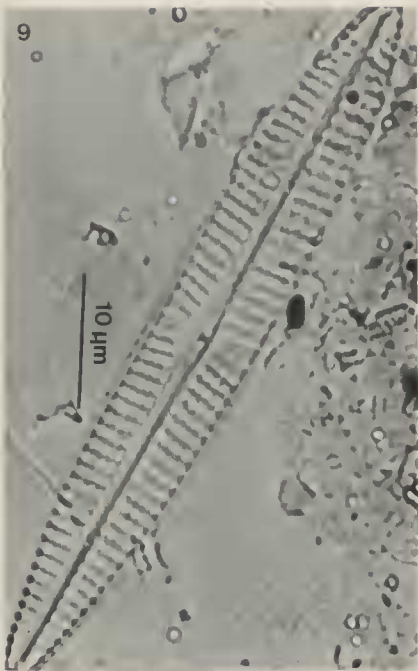


Plate IV. — *Navicula gracilis* Ehr. var. *mandurahensis* var. nov. (L.M.), 9: valve view

of striae, presence of stigmata at the centre and the hyaline rectangular area on each side of the central part of the valve (Plate III, fig. 8).

NAVICULA GRACILIS EHR. VAR. *MANDURAHENSIS* VAR. NOV.

(Plate IV, fig. 9).

Valva convexa, apicibus acutis, cuneiformis, margines paralleli, area axiali lineari angusta, area centrali elliptico-lanceolata, raphe apicibus proximalibus approximatus, striis dissitis, radiatis ad versus centrali, parallelis ad versus apicibus, distinctis punctatis 1 ad 2 striis brevis ad centrum. Longitudo 50-58µm, latitudo 8-10µm, striae 9-10 in 10µm, punctae 14 in 10µm.

Valve convex with acute wedged shaped ends and parallel margins. Axial area linear narrow. Central area elliptic-lanceolate. Proximal ends of raphe closely spaced; one to two short striae at the centre. Striae well spaced, radiate toward the centre, becoming parallel toward the apices, distinctly punctate. Length 50-58µm, breadth 8-10µm, striae 9-10 in 10µm, punctae 14 in 10µm.

Holotype. — A.G.C. No 40089. (Deposited at the Diatom Herbarium, Academy of Natural Sciences, Philadelphia, U.S.A.).

Type locality. — Peel Inlet, Mandurah, Western Australia.

Distribution. — The Peel-Harvey estuarine system, Mandurah, 80 km South of Perth, Western Australia.

Discussion

This taxon is characterised by the wedged shaped apices, closely arranged proximal ends of raphe and the distinct punctae.

This diatom was collected in 1977 in very small numbers, from the Peel Inlet and Harvey estuarine system, in the planktonic form. The salinity in the estuary ranges from 2‰ in winter to about 51‰ in mid autumn.

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